Unit 6: Nitrogen Cycling

Unit Summary: Nitrogen has much greater potential to increase atmospheric heat absorption than carbon dioxide. In addition, in many instances it is one of or the most expensive additive farmers apply to maximize crop yields. Combined these two factors make the management of nitrogen and an understanding of the nitrogen cycle one of the most important components of modern agricultural production.

Teaching Time: It is anticipated that this unit and its related activities will take a minimum of three 50-minute class periods to complete. Depending on the number of readings utilized, this could be longer. Also the depth of utilization of the laboratory activities and the desired level of student mastery may add time to the length of the unit.

Audience: 9-12 Science & Agriculture Students

Unit's placement in the overall course: This unit is designed to be taught as part of a sequence with one unit covering the carbon cycle and the second unit covering the nitrogen cycle. Both units complement each other. While these units can stand alone, they are included as an essential knowledge set needed to understand the complex science underlying climate change. Carbon dioxide and nitrous oxides are two of the most culpable gasses in the storage of heat in the atmosphere, and both are produced in high quantities in the agricultural production of plants and livestock.

Goals: The goal of this unit is for students to have an understanding of the nitrogen cycle, it many components, and the diverse number of possible pathways nitrogen can take as it moves through its cycle.

Description of the unit: This unit contains a short presentation which includes a series of multiple choice questions designed to both assess understanding as well as to spark discussion in the classroom. Three activities designed to get students actively engaged with the nitrogen cycle are also included. Teacher notes are supplied with most slides to help guide class discussion. In addition, a comprehensive reading on agriculture and climate change and an article specifically on Nitrogen are included to augment discussion. As well one of the activities encourages the exploration of additional readings from internet sources.

Using this unit: Within the PowerPoint for this unit are hidden slides. On these slides are embedded Microsoft Word Documents. These documents provide the additional resources needed to deliver this unit. A standards document is provided which includes the relevant Next Generation Science Standards, Common Core State Standards for Math and ELA, and Agriculture, Food, & Natural Resources Standards. The standards included may be only introduced through this curriculum, and the teacher will need to decide the level at which they want to augment the provided instruction in relation to these standards. Readings associated with the unit are in a separate zipped PDF file. This document includes all the readings in one zipped file so teachers can select those readings most appropriate for their classrooms.

This material provided free of charge and is based upon work that is supported in part by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2011-68002-30191.

Related Readings for Meeting CCSS in ELA: These readings are not overly technical, however teachers reported some difficulty using them with students on IEP's. To accommodate these students it is recommended teachers choose a portion of the readings and run it through an application like http://www.rewordify.com which can adjust the reading levels as needed.

Required Supplies:
Copies of the activities and poster pages from the activity pages are required. In addition, groups will need dice to roll to determine their movement through the nitrogen cycle.

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